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PL I

PART I.

THE

FLORA SYLVATICA

FOR

SOUTHERN INDIA:

CONTAINING QUARTO PLATES OF ALL THE PRINCIPAL TIMBER TREES IN SOUTHERN INDIA AND CEYLON, ACCOMPANIED BY A BOTANICAL MANUAL, WITH DESCRIPTIONS OF EVERY KNOWN TREE AND SHRUB, AND ANALYSIS OF EVERY GENUS NOT FIGURED IN THE PLATES.

BY

MAJOR R. H. BEDDOME,

CONSERVATOR OF FORESTS.

AMENDED COPY

OF

PART I

OF THE

"FLORA SYLVATICA OF SOUTHERN INDIA."

Madras:

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156

POLYALTHIA CERASOIDES. (Nat. order Anonaceæ.)

POLYALTHIA, (*Bl.*) *Gen. Pl. page* 25.—GEN. CHAR. Sepals 3, rarely more free or connate below, valvate or slightly imbricate in æstivation; petals 6, rarely more equal or subequal, valvate in 2 series in æstivation, ovate or linear, stamens numerous linear or cuneate, connective dilated and thickened beyond the cells, carpels numerous. Stigma oblong or capitate, ovules one or two usually erect; fruit carpels stipitate or oblong 1-seeded. Trees or shrubs.

POLYALTHIA CERASOIDES. (Dun.) Leaves oblong or lanceolate acute, pubescent beneath, flower bearing shoots almost abortive lateral leafless; peduncles solitary, terminal, with one or two bracteas at their base; calycine lobes 3-4 nearly as long as the the corol, petals 6-9 equal oval oblong thick, carpels globose dark red size of a cherry, on stalks nearly twice their length. *DC. Prod.* i. *p.* 93. Guatteria cerasoides, *WA. Prod. p.* 10. Uvaria cerasoides, *Roxb. Fl. Ind.* ii. *p.* 666.

A straight handsome tree of moderate size, timber whitish and close-grained and of considerable value, much used in the Central Provinces and in the Bombay Presidency. It is used in carpentry and for naval purposes, such as boat masts and small spars, but apparently little known in Madras. It is common in dry forests near the foot of all the mountains on the western side of the Madras Presidency, in the Salem forests, the Nullay Mullays, Mysore, Orissa and the Godavery forests; it flowers in the hot months and the flowers are fragrant and of a greenish color. It has never yet been cultivated or planted. In the Godavery forests it is known by the names of Dudugu and Chilka Dudugu (Teligoo), and in the Bombay Presidency it is called Hoom, (Mahr.)

Analysis.

1. A full flower, sepals 3, petals 6, (the normal number.)
2. The same, petals removed, shewing the closely packed mass of stamens, surrounding the ovaries.
3. The same, sepals and most of the stamens and some of the ovaries removed to shew the torus.
4. A flower with 4 sepals and 7 petals.
5. The same, petals removed.
6. Vertical section of the same.
7. A stamen.
8. An ovary.
9. Vertical section of an ovary, ovule solitary erect. (Drawn from dried specimens.)

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Coverdale del. Dempsey Lith.

Polygalkhia cerasoides (Dunal)

CALOPHYLLUM ELATUM. (Nat. order Guttiferæ.)

CALOPHYLLUM, *Linn. Gen. Pl. p.* 175.—GEN. CHAR. Flowers often polygamous, perianth composed of 4-12 sepals and petals imbricated in 2-3 series, stamens numerous free or scarcely connate at the base; filaments short filiform, anthers erect ovate or oblong 2-celled dehiscing longitudinally, ovary 1-celled, style longish, stigma peltate, ovule 1 erect, drupe indehiscent. Trees, leaves coriaceous shining furnished with numerous striated parallel nerves, panicles axillary or terminal.

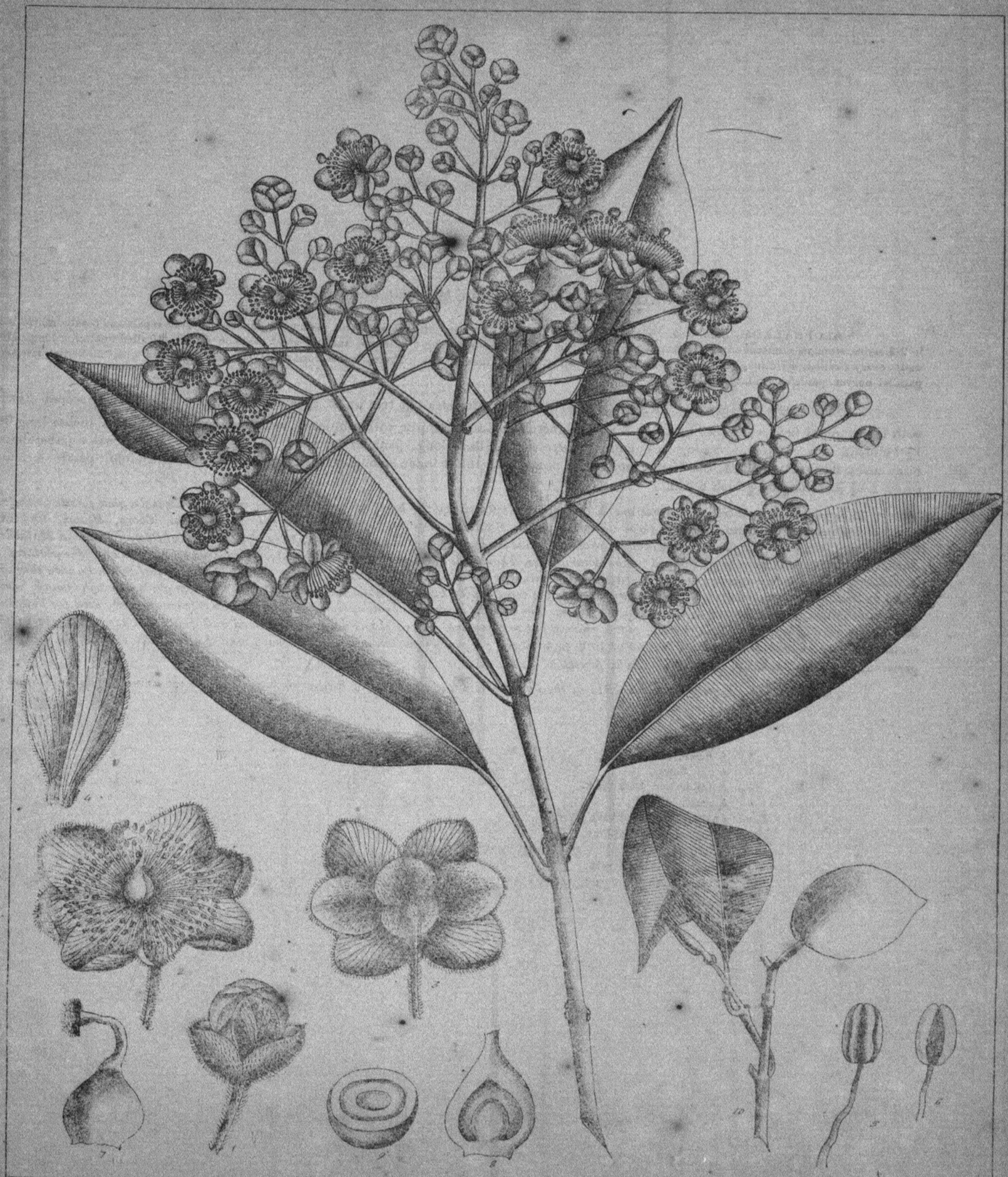
CALOPHYLLUM ELATUM. (Bedd.) A very lofty straight tree up to considerable girth, bark deeply scored down with longitudinal fissures, young branches 4 sided puberulous, leaves elliptic with a bluntish acumination, generally 4-5 inches long by 1¼-1½ broad very coriaceous shining and glabrous, petioles 6-12 lines long, panicles terminal and from the upper axils puberulous large many-flowered, sepals 4, the 2 outer ones small subrotund, the 2 inner oblong-oval in age petaloid or subpetaloid, petals 4, fruit ovoid 1-1¼ inch long by ¾ inch broad.

A very large straight tree with numerous longitudinal cracks down the bark, grows abundantly in most of the moist ghat forests or sholas on our western coast from Canara down to Cape Comorin, and in similar forests on the lower Pulneys, Anamallays, Coorg, Mysore, and the Sirumallays; it is never found in dry deciduous forests. It yields the Poon spar of commerce, and is known by the name of Poon or Poone in Malabar, Siri Poone in South Canara, and Pongoo in the Anamallays. Thousands of these trees have lately been destroyed by the axe of Coffee planters in Malabar, Coorg and Travancore; large quantities still remain, but chiefly in very inaccessible places. In the ghat forests of South Canara they are felled by the Forest Department and floated down rivers to the coast depôts, but the demand for the article does not seem great, though many years ago a single fine spar has fetched as much as 1000 rupees. The wood is scarcely known, except as a spar, though it is occasionally used for building and bridge work by planters; it is reddish, coarse grained but ornamental. The tree has never been planted and would not succeed except in the moist forests on the mountains at an elevation of 1000 to 4000 feet; it flowers in January and February, and the seed falls early in the rains and germinates freely in the dense shade of the shola forests.

This tree was for some years supposed to be the Calophyllum angustifolium of Roxburgh, which is from the Prince of Wales' Island.

Analysis.

1. A flower bud.
2. A full flower.
3. A full flower, back view.
4. A petal.
5. Anthers, front and back view.
7. Ovary, style and stigma.
8. Ovary cut vertically, 1 cell, 1 erect ovule.
9. Ovary cut transversely.
10. Fruit (Drawn from dried specimens).



Calophyllum elatum (Wedd.)

PÆCILONEURON INDICUM. (Nat. order Ternstræmiaceæ.)

PÆCILONEURON, *Bedd.*—GEN. CHAR. : Sepals 4-5 equal or unequal imbricate, petals 5-6 imbricate or contorted. Stamens numerous (16-22) in 2 rows, filaments free at the base or joined into a tube at the very base (in age splitting and becoming subpentadelphous), anthers linear erect basifixed often crenulato-undulate, ovary 2-celled, ovules 2 in each cell erect, styles 2 subulate. Fruit capsular subglobose 1-celled 1-seeded, dehiscing into 2 coriaceous valves. Seed hard, testa loose membranaceous striated, cotyledons thick fleshy, exalbuminous. Trees, with hard heavy timber, leaves opposite entire very coriaceous and shining, veins parallel and veinlets beautifully reticulated, flowers rather showy white in terminal panicles or axillary and solitary or paired.

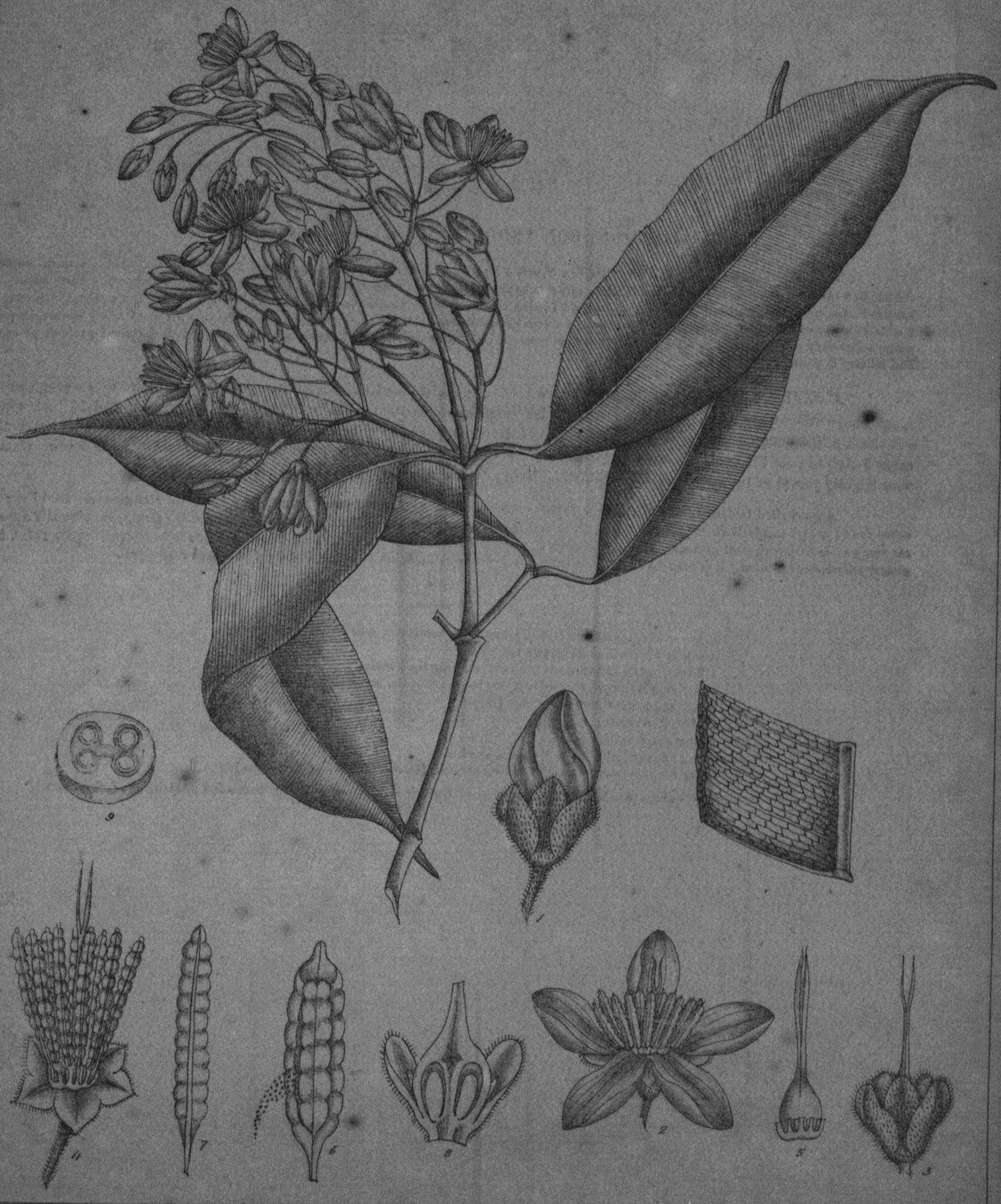
PÆCILONEURON INDICUM. (Bedd.) A large glabrous tree, leaves oblongo-ovate to elliptic with a longish rather blunt acumination, when dry quite pitted on both sides from the reticulation of the veinlets, 3½-6½ inches long by 1-2½ inches broad, petioles 4-8 lines long, flowers white in much branched terminal minutely puberulous panicles, pedicels 4-8 lines long puberulous, calyx 5-cleft to near the base, segments obtuse puberulous on the outside, petals 5 imbricate, stamens about 20 in 2 rows, filaments very slightly joined at the very base, disk obsolete. *Bedd. in Journ. Linn. Soc.* viii. 267 *t.* 17.

A good sized tree, common in the ghat forests of South Canara, Malabar, and Travancore up to an elevation of 4000 feet ; it is never found except in the shola forests ; in South Canara it is well known to the natives under the name of Kirbally (Can.), but though I have seen the tree on the Sisparah ghat and elsewhere in Malabar, it seems unknown to the natives. The timber appears to be of considerable value, but is almost unknown at present ; it is very hard and is used for rice pounders in South Canara ; it flowers in March and April.

Analysis.

1. A flower bud, sepals 5 imbricate minutely puberulous, petals 5 (white) imbricate.
2. A full flower (anthers bright yellow.)
3. A flower, petals and stamens removed, showing the 2 styles.
4. A flower, petals removed, shewing the insertion of the stamens in 2 rows.
5. Ovary and 2 styles and base of the stamens.
6. Anther, front view.
7. Anther, back view.
8. Ovary cut vertically 2-celled, ovules erect.
9. Ovary cut transversely 2-celled, cells 2-ovuled. (Drawn from living specimens.)

(*N. B.*—At page xxiv of the Manual, in the description of the fruit of P. pauciflorum, 3¾ inches is a misprint for ¾ of an inch.)



Pacilonecaron Indicum (Beddl.)

SHOREA ROBUSTA. (Nat. order Dipterocarpeæ.)

SHOREA, *(Roxb.) Gen. Pl. p.* 193.—GEN. CHAR.: Calyx tube very short adnate to the torus, not increasing in fruit, divisions ovate or lanceolate imbricate wing-like and all or 3 only enlarged in fruit, connivent over the fruit at the base. Stamens numerous or 15, anthers ovate or oblong, rarely linear, connectivum subulato-cuspidate, cells obtuse or rarely cuspidate, valves equal or the exterior valve a little larger, ovary 3-celled, cell 2-ovuled, style subulate, entire or 3-toothed at the apex, fruit coriaceous indehiscent 1-seeded; seed ovoid, cotyledons thick fleshy unequal. Trees bearing resin, glabrous or tomentose, stipules persistent or deciduous, leaves entire or repand, panicles axillary or terminal.

SHOREA ROBUSTA. (Roxb. *Fl Ind.* ii. *p* 615.) For description, vide Manual page xxvi.

An immense timber tree, abundant in the Godavery forests, the Gumsoor and Russelcondah forests, and in Bengal (the Terai, Parasnath and Assam), and in Birmah? but not known in the south of the Madras Presidency. In some of the Sâl tracts in Gumsoor it grows almost to the exclusion of every other tree, and the natural forests often have the appearance of plantations. It flowers in March and April, and the seeds often commence germinating before they leave the parent tree early in the rains, and eventually come up very thickly in the forests. The tree grows very straight and tall, and sometimes reaches 10 *or* 12 *feet in girth. The seed has a vitality of such short duration that all attempts to grow it in the South have failed, though it was attempted several successive seasons; it is also rapidly bored by insects. The timber is one of the most valuable in India for engineering purposes, and is largely used in Gun Carriage Manufactories and for many other purposes, such as house-building and ship building, but warps in plank; it lasts an immense time under ground or under water, and is almost unequalled for sleepers, and seems quite proof against white ants; it is strong, tough, coarse-grained and fibrous, not easily worked, and when dressed has a hard horny surface and the fibres appear to be interlaced with each other; it is superior to Teak in transverse strength and direct cohesive power, but is subject to shrinkage; a cubic foot unseasoned weighs* 68·72 *lbs. and* 55 *lbs. when seasoned, and its specific gravity is* ·880. *The bark is employed by tanners and yields an abundance of resin or dammer which is used as a substitute for pitch, and burnt by the natives as incense, and an aromatic oil is procured from the resin by dry distillation. It is called Sâl and Salwa in Gumsoor, and Googul in the Godavery forests. I am not sure that the Birmese tree called Eingg-yin is the same species.*

Analysis.

1. A flower bud, sepals and petals 5 both imbricate.
2. A full flower, stamens very numerous in 3 rows.
3. Calyx, ovary and style.
4. Apex of the style slightly 3-lobed.
5. Stamens and ovary removed from a flower.
6. A highly magnified portion of the mass of stamens.
7. A petal.
8. Anther, front view, cells hairy at the apex.
9. Anther, back view, connective produced into a long point with a bearded apex.
10. Ovary cut vertically, each cell with 2 pendulous ovules.
11. Ovary cut transversely, 3-celled, cells 2-ovuled.
12. A fruit, the 5 calyx segments all enlarged into wings. (Drawn from dried specimens.)

Shorea robusta (Roxb.)

SHOREA TUMBAGAIA. (Nat. order Dipterocarpeæ.)

For Gen. Char. see letter-press to Pl. iv.

SHOREA TUMBAGAIA. (Roxb.) For description, &c. see Manual p. xxvi

I have only met with this tree in the hill forests of Cuddapah and North Arcot; it is a large tree yielding a valuable timber, and is well known in those districts under the name of Thambà; it is largely used in house building and for rafters, door frames and posts, and is exported to Madras; a dammer exudes from the trunk. The Kong of Tinnevelly is not this tree, but belongs to the allied genus Hopea.

Analysis.

1. A flower bud, calyx-sepals imbricate, petals contorted.
2. A full flower.
3. The same petals removed, stamens 36 sub-3 serial (the number varies from 32 to 55), stigma shortly 3-cleft at the apex.
4. A petal.
5. 3 stamens removed.
6. Anther, front view, cells hairy at the apex.
7. Anther, back view, the connective prolonged from below the apex of the cells into a filiform hairy appendage.
8. Ovary cut vertically, ovules attached to centre of axis.
9. Ovary cut transversely 3-celled, cells 2-ovuled.
10. A fruit, the 5 calyx sepals all enlarged into wings but unequal in size. (Drawn from flowers in spirits.)

Shorea Jumbagaia (Roxb.)

SHOREA LACCIFERA. (Nat. order Dipterocarpeæ.)

For Gen. Char. see letter-press to. Pl. iv.

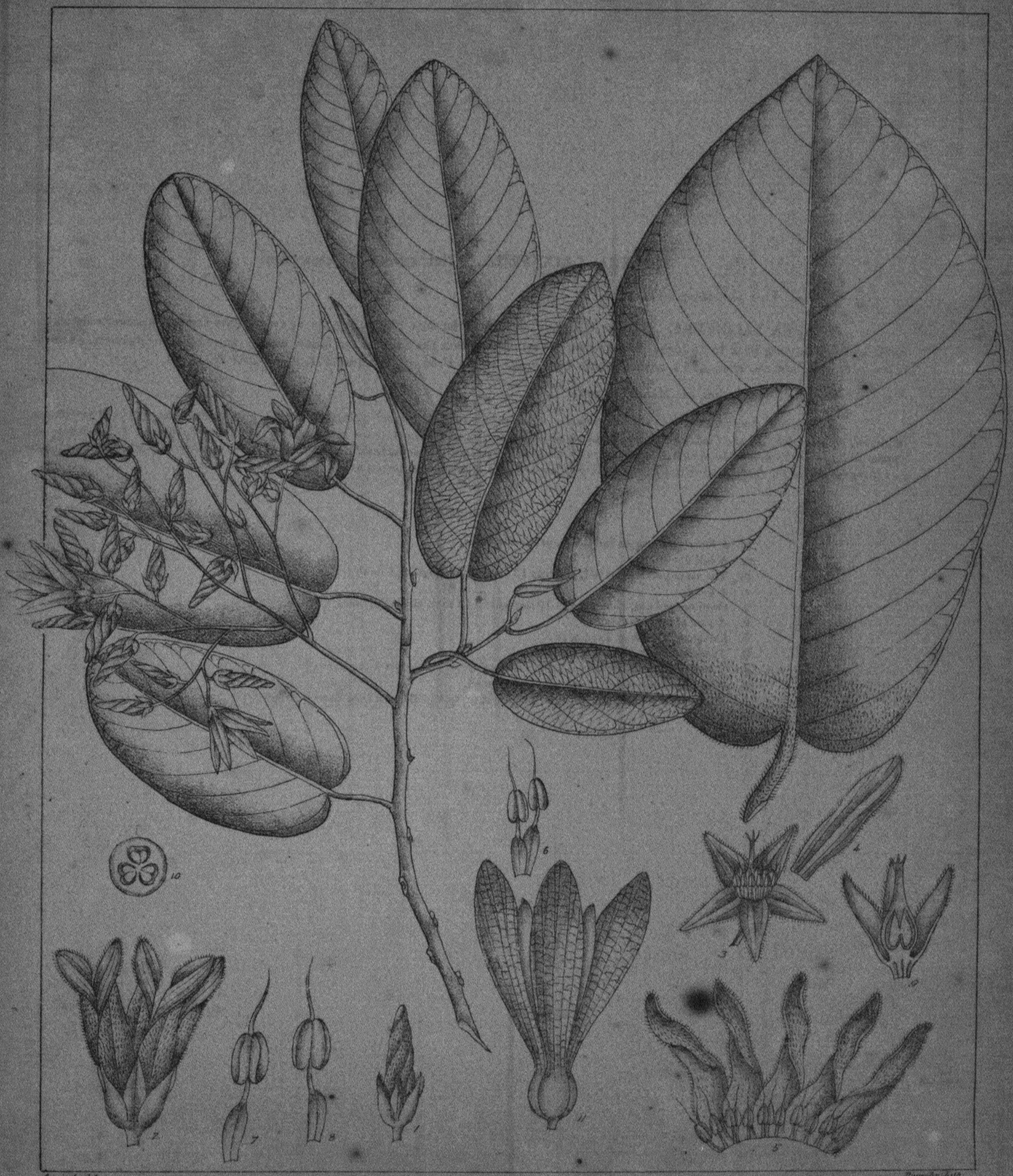
SHOREA LACCIFERA. (WA.) Glabrous, leaves coriaceous oblong obtuse or emarginate and often emarginate at the base, 3½-5 inches long by 2 to 2½ inches broad; panicles numerous from the axils of the fallen leaves, branches and pedicels glabrous calyx in flower glabrous, stamens 15, anther-bristle very long. *WA. Prod. p.* 84 under Vatica. *Wight Ic. t.* 164.

For fuller description, see Manual p. xxvi.

A large tree, very abundant in the hill forests of Cuddapah and North Arcot, and also found in the Mudumallay forests, Anamallays, Wynaad, Mysore, &c. In the Cuddapah and North Arcot districts it is well known under the name of Jallari (Tel.), but the tree does not appear to be generally known in the other localities; its timber is very useful for housebuilding, pannels of doors and various other purposes, and has a ready sale in the Cuddapah district, and is largely exported to Madras. A species of lac is procured from the tree.

Analysis.

1. A flower bud, sepals imbricate, petals contorted.
2. A full flower.
3. The same petals removed, stamens 15 alternately single and double.
4. A petal.
5. Corol opened out, shewing the 15 stamens in 10 rows alternately single and double.
6. A pair of anthers removed.
7. Stamen and anther, front view.
8. The same, back view.
9. Ovary cut vertically, ovules attached to centre of axis, style 3-toothed.
10. Ovary cut transversely 3 celled, cells 2-ovuled.
11. Fruit, all 5 sepals enlarged into wings but unequal. (Drawn from flowers in spirits).



Shorea laccifera (Wall.)

HOPEA PARVIFLORA. (Nat. order Dipterocarpeæ.)

HOPEA, *Roxb. Gen. Pl. p.* 193.—GEN. CHAR. : Calyx tube very short adnate to the torus not increasing in fruit, divisions short obtuse often membranaceous on the margin imbricate, 2 enlarging in fruit large and wing-like erect, the rest small all connivent over the fruit at the base. Stamens 15 rarely 10, anthers ovate, connectivum subulato-cuspidate, cells obtuse equal valved. Ovary 3-celled, cell 2-ovuled, style short terete or subulate. Fruit indehiscent, 1-seeded, seed ovoid, cotyledons thick fleshy unequal. Trees, yielding resin glabrous or tomentose, stipules small deciduous or inconspicuous, leaves entire coriaceous. A genus nearly allied to Shorea.

HOPEA PARVIFLORA. (Bedd.) Petioles panicles and calyx hairy, leaves short petioled glabrous ovate to oblong furnished with glands in the axils of the veins beneath, 2 to 2½ inches long by 1 to 1½ broad, flowers secund subsessile numerous very minute, sweet scented, stamens 15 alternately single and in pairs, stigma 3 cleft.

For fuller description, see Manual p. xxvii.

A large handsome tree common in both the moist and dry forests in Malabar, Travancore, and South Canara, up to an elevation of 3500 *feet. The wood is hardly known commercially as yet, but it is much valued by the natives in South Canara, and I believe it will be of great value for gun carriage purposes, and I have forwarded specimens to Madras and Bombay ; it will also answer well for sleepers. In Malabar it is called Irubogum and in South Canara Kiral Boghi on the ghats, and Tirpu in the plains ; in the latter district it is much valued for temple building purposes.*

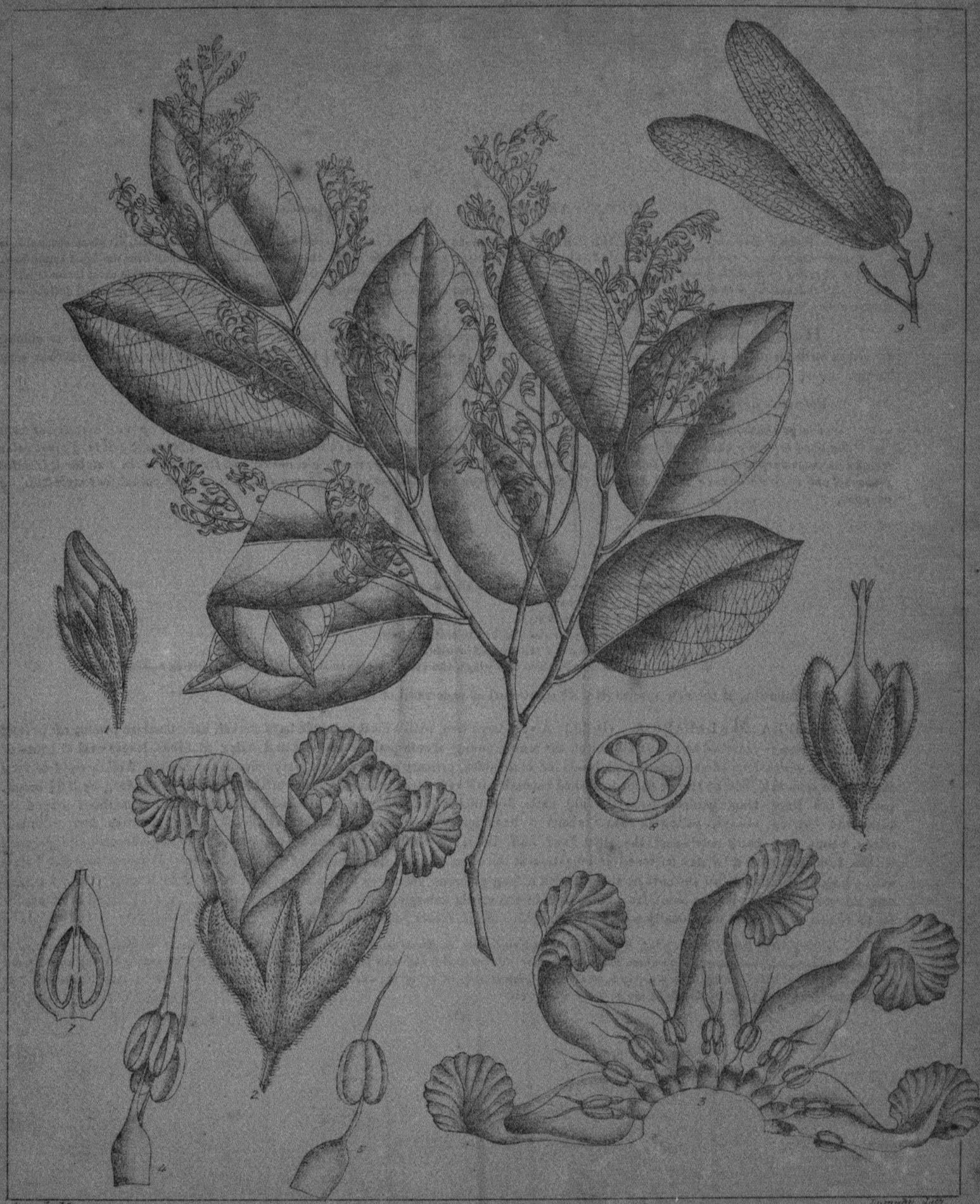
Analysis.

1. A flower bud.
2. A full flower.
3. Corol opened, shewing 15 stamens in 10 rows alternately single and double.
4, 5. Stamens, front and back view.
6. Calyx, ovary and 3-cleft style.
7. Ovary cut vertically, ovules attached to centre of axis.
8. Ovary cut transversely 3 cells, cells 2-ovuled.
9. Fruit, 2 sepals only enlarged into wings, the other 3 sepals small. (All drawn from living flowers.)

The following is the new species (No. 3.) mentioned at page xxvii of the Manual.

HOPEA MALABARICA. (Bedd.) A very large tree, with a most valuable hard timber, bark blackish peeling off in long strips which become recurved and hang all round the trunk, young shoots petioles panicles and calyx glabrous, leaves oval or ovate or broad-elliptic with a longish acumination, glabrous on both sides, primary veins distant very prominent beneath 3 or rarely 4 or very rarely 5 on each side, one or two of them furnished beneath with very large glabrous glands in the axils, 4-6 inches long by 2-2¾ broad, petioles 6-9 lines long, panicles from the old axils 3-4 inches long, flowers pedicelled rather distant, sometimes secund or subsecund but not always, yellowish white about 5 lines long (much larger than in parviflora), calyx glabrous but minutely ciliate, petals very hairy outside on the right hand half, the inner half which is imbricated whilst in bud glabrous, quite glabrous within, furnished with a twisted flattened prolongation at the apex, stamens 15 alternately single and double, filaments very flat below with a long apiculation below the anther, anthers with a long glabrous setaceous bristle more than twice their length. Stigma with 3 very minute points (under the lens), fruit glabrous 2 of the sepals enlarging into wings, 3-3¼ inches long by 1-1¼ broad prominently 10-12 veined, a 3rd sepal occasionally somewhat enlarged. *Bedd. Icones part* x. *tab.* clxxxv.

A very large tree, Carcoor ghat, Wynaad, Anamallay forests, in flower in February and March, called Kallu in Malabar, it is allied to Hopea parviflora, but has glabrous panicles and much larger flowers and fruit, and the leaves differ considerably generally having only 3 *(very prominent) lateral veins, rarely* 4 *very rarely* 5, *with large glands only in* 1-2 *of the axils, whereas in parviflora there are* 5-9 *veins, (generally* 7-8) *not so prominent, and smaller glands in the axils of almost all.*



Cornado del. Lumpitz Lith.

Hopea parviflora (Beddome)

SOYMIDA FEBRIFUGA. (Nat. order Meliaceæ.)

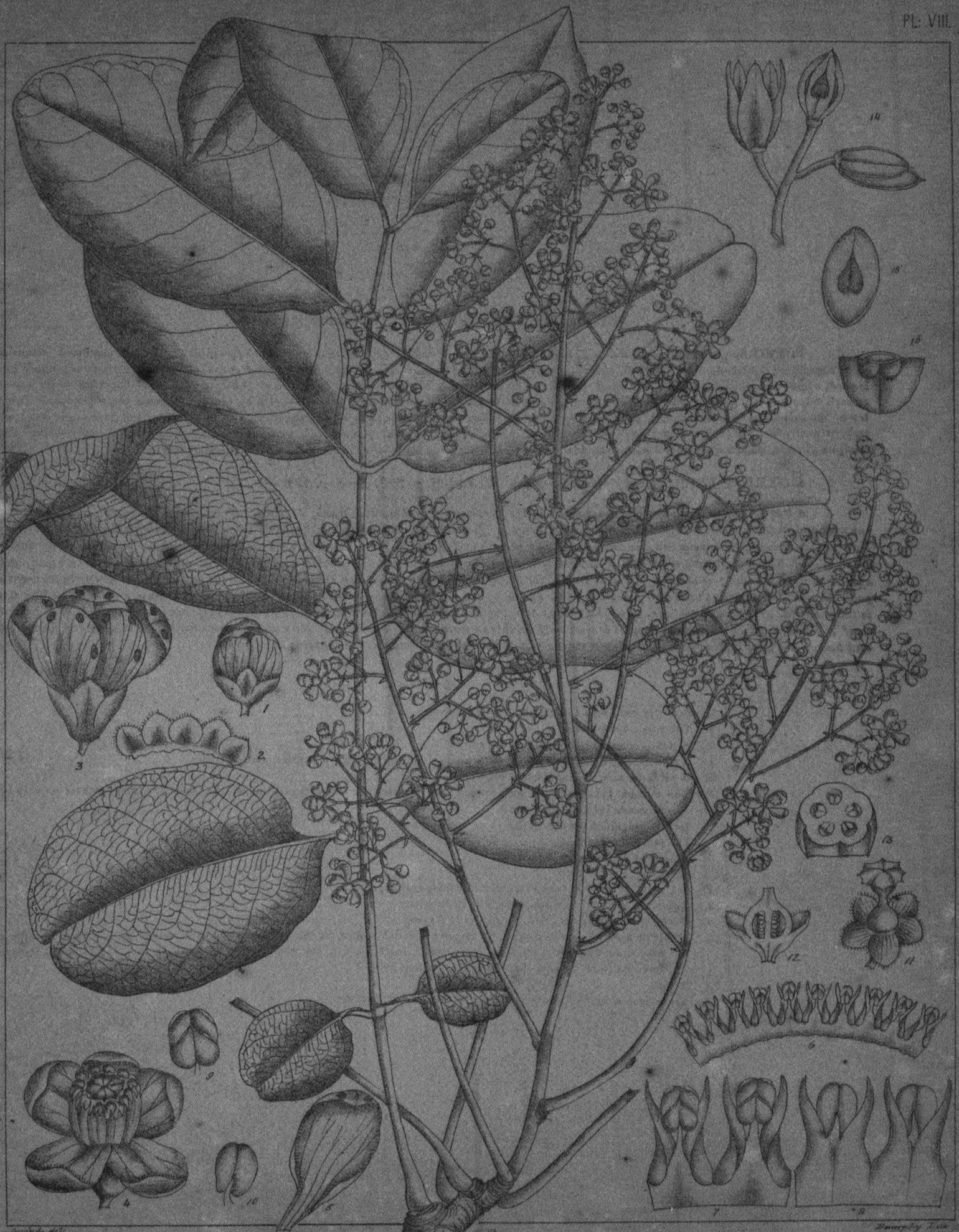
SOYMIDA, (*A. Juss.*) *Gen. Pl. p.* 328.—GEN. CHAR. : Sepals 5 short imbricate, petals 5 spreading unguiculate contorted, stamen-tube short cupuliform 10-lobed, lobes 2-toothed, anthers sessile between the teeth, disk ring-like, ovary ovoid 5-celled, style short attenuated, stigma dilated 5-sided, ovules numerous in the cells in 2 series pendulous, capsule woody 5-celled 5-valved, dehiscing at the apex septifragal, the thin woody sarcocarp on each valve becoming detached from the endocarp and both from the persistent axis that is 5 angled by the dissepiments, seeds pendulous from the top of the axis imbricated in each cell, flat expanding on all sides but particularly upwards (with the hilum at the extremity) and downwards into a wing; embryo nearly straight, cotyledons 2-auricled at the apex, radicle conical pointing upwards concealed between the auricles of the cotyledons. Leaves abruptly pinnate, leaflets opposite 3-6 pair, oval-oblong obtuse, panicles large terminal or in the axils of the uppermost leaves.

SOYMIDA FEBRIFUGA. (Juss.) *Roxb. Fl. Ind.* ii. *p.* 398, *Prod. p.* 122.

A tree of considerable size, not uncommon in the forests of Palghat, Cuddapah, Gumsoor, Mysore and elsewhere in the Madras Presidency, and in the Central Provinces, Bombay and Bengal. It yields a valuable dull red colored wood that is highly prized by the natives for building purposes, and is very durable and strong, but though well adapted for all indoor work, it is apt to split on exposure to the sun ; the grain is tolerably close but not even and does not work smoothly ; a cubic foot unseasoned weighs 80-85 *lbs. and* 66 *lbs. when seasoned, and its specific gravity is* 1·056 *; it is one of the best woods for clamps in masonry walls, and it makes most excellent piles, and if properly seasoned very good sleepers. The bark is used as a febrifuge ; it is known by the names of Sohn or Rohn in Bengal, Soomi in Teligoo, and Shem in Tamil, and is the red cedar of Europeans. Mr. Broughton says that the substance to which the bark owes its bitter taste has the properties of a resin and is of a yellowish white color when pure, it is sparingly soluble in water, but is unsoluble if the water contains acids ; it is soluble in alcohol, ether and benzol, but these liquids do not completely separate it from foreign substances ; it contains no nitrogen.*

Analysis.

1. A flower bud, sepals imbricate, petals contorted.
2. The calyx opened out.
3. A flower shewing the glands on the petals.
4. A flower fully opened, exposing the stamen tube, the anthers of which open introrsely,
5. A petal shewing its unguiculate base.
6. The stamen tube removed and opened out, shewing its inner face 10-lobed, the lobes 2-toothed, anthers on very short filaments between the teeth.
7. Highly magnified portion of the same, inside view.
8. The same, outside view.
9. Anther and filament, inside view.
10. The same, outside view.
11. Ovary, style and the very large dilated pentagonal stigma.
12. Ovary cut vertically, ovules numerous in 2 series.
13. Ovary cut transversely, 5-celled, ovules in 2 rows.
14. 3 fruit or woody capsules in various stages after dehiscence, in the left hand one the 5 valves are present just after they have burst open from the apex, in the right hand one 4 of the valves have fallen off, in the centre one all the valves have fallen off leaving the 5-angled persistent axis.
15. A seed.
16. Transverse section of the same. (Drawn from dried specimens.)



Swinda del. *Humphry Lith.*

Swymida febrifuga (Juss.)

CHICKRASSIA TABULARIS. (Nat. order Meliaceæ.)

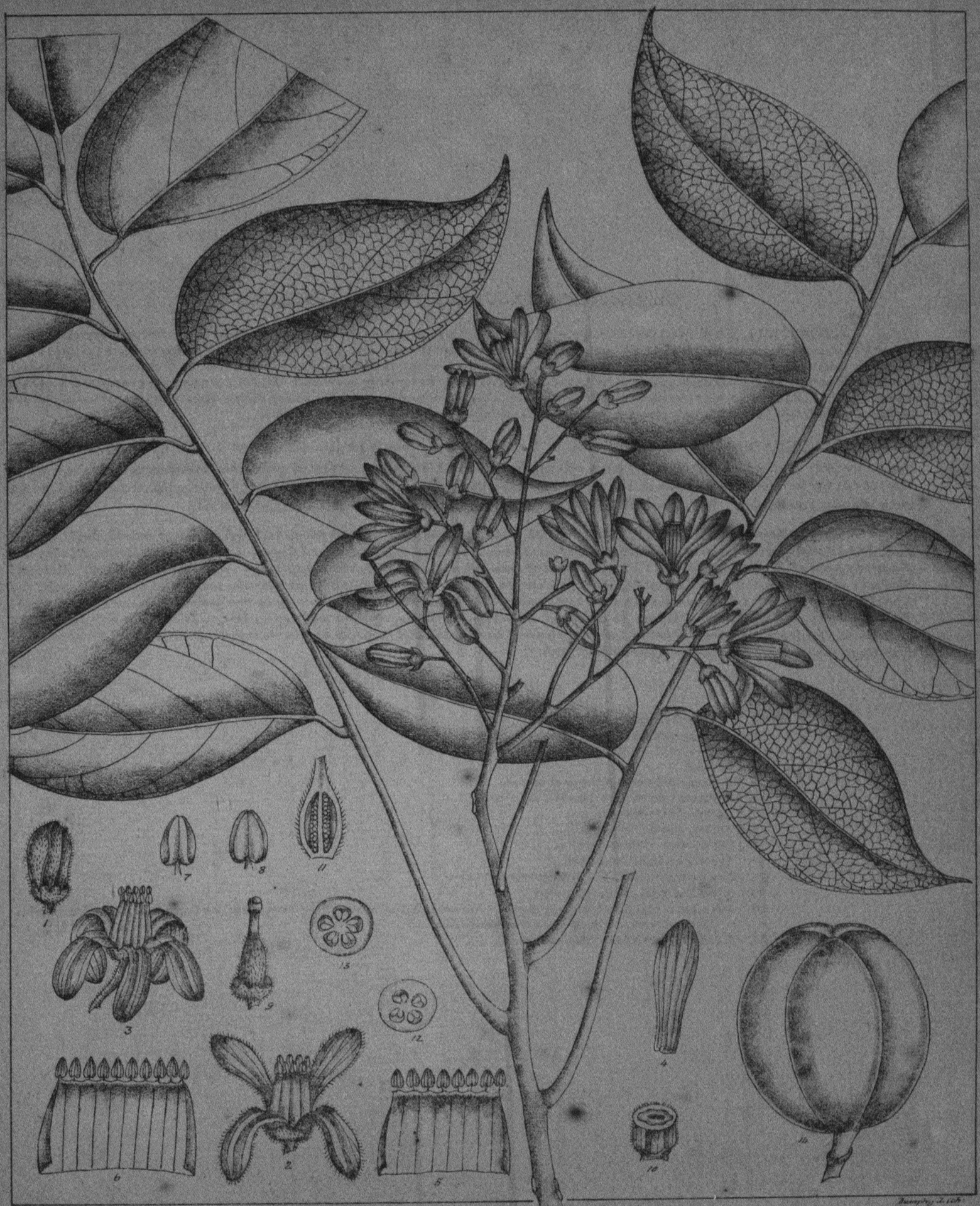
CHICKRASSIA, (*Ad. de Juss.*) *Gen. Pl. p.* 339.—GEN. CHAR.: Calyx short cupular 4-5-toothed, petals 4-5 erect contorted, stamen tube cylindrical 8-10-crenated, the crenatures each bearing 1 anther, anthers ovate exserted erect introrse, disk none, ovary oblong shortly stipulate 3-5-celled attenuated into a style, stigma capitate, ovules numerous in 2 series, capsule ovoid woody 3-celled septicidally 3-valved at the apex, valves 2 lamellate and separating from the 3-winged axis, seeds numerous imbricated in a double series horizontally across each cell, flat expanding downwards (at the opposite extremity of the hilum) into a wing; cotyledons orbicular not auricled, radicle superior cylindrical oblong oblique exserted applied to the edge of the cotyledons at their top. Leaves abruptly pinnated, leaflets opposite and alternate acuminate, panicles terminal.

CHICKRASSIA TABULARIS. (Juss.) Leaves alternate abruptly pinnate 6-18 inches long, leaflets 5-10 pair suboppo-site or alternate shortly petioled, obliquely ovate oblong, unequal sided, obtusely acuminated quite entire and increasing in size towards the apex of the leaf, hairy in the axils of the nerves beneath, stipules none, panicles terminal erect, flowers numerous rather large of a dirty white or cream color. *WA. Prod.* 123. Swietenia Chickrassia, *Roxb. Fl. Prod.* ii. 398;—*Wight Ill.*

A tree of large size, often 8 *to* 10 *feet in girth with a thick straight trunk* 60 *or* 80 *feet to* 1*st bough, and rust colored deeply cracked bark, found though sparingly in most of the hill forests of the Madras Presidency both in shola and deciduous forests, and in Mysore, Bombay and the eastern parts of Bengal: it is the true Chittagong-wood of commerce, and is called Aglay or Agal in some parts of our Presidency, Madagari Vembu in others, Gânti Mâlle in Salem, and in Bengal Chickrasee. The wood is of a light color and prettily veined and close in the grain, and is much used for furniture; it has a cedar-like smell and is one of the woods known to Europeans as bastard cedar; unseasoned it weighs* 50-54 *lbs. the cubic foot, and when seasoned* 42 *lbs. No attempt at cultivating this tree on any large scale has yet been made, but specimens are met with in Botanical Gardens; in Ceylon it is known under the name of Hoolanghik, and its timber used in the interior of the palace of one of the Kandyan kings, is known to have lasted some hundreds of years.*

Analysis.

1. A flower bud, petals contorted.
2. A flower with 4 petals.
3. A flower with 5 petals.
4. A petal.
5. A stamen tube with 8 (introrse) anthers.
6. A stamen tube with 10 (introrse) anthers.
7. Anther, inside view.
8. Anther, outside view.
9. Calyx, ovary, style and stigma.
10. The stigma highly magnified.
11. Ovary cut vertically, ovules numerous in 2 rows.
12. A 4-celled ovary, ovules in 2 rows.
13. A 5-celled ovary (sometimes only 3-celled? but not found so in any of my dissections), the 4-celled ones were from octandrous flowers and the 5-celled from decandrous ones.
14. A fruit. (Drawn from dried specimens.)



Chickrassia tabularis (Juss.)

CEDRELA TOONA. (Nat. order Meliaceæ.)

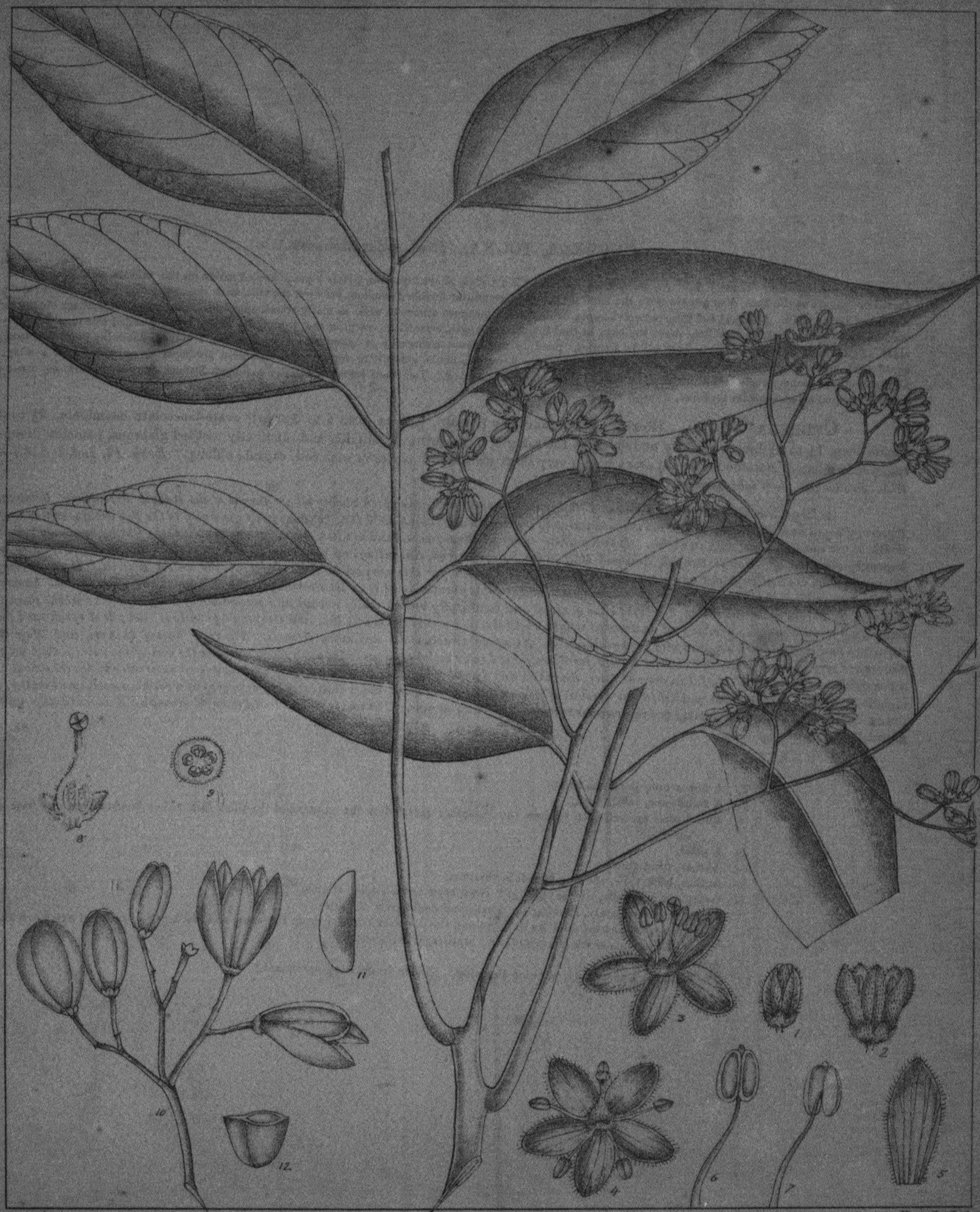
CEDRELA, (*Linn.*) *Gen. Pl. p.* 339.—GEN. CHAR : Calyx short 5-partite, petals 5 erect keeled inside on the middle, imbricate or contorted or valvate at the base, disk adnate with the base of the ovary grandular 5-ribbed concrete between the ribs with the interposed plaits of the petals, 4-6-lobed at the apex. Stamens 4-6 inserted on the apex of the disk sometimes alternate with as many staminodes, filaments subulate, anthers oblong or cordate attached by their back a little above the base, at first introrse at length versatile; ovary on the top of the disk, ovoid 5-celled attenuated into a style, stigma dilated, ovaries 8-12 in each cell in 2 series, pendulous; capsule coriaceous or membranaceous 5-celled, 5-valved, dehiscing from the apex, septifragal, valves 2 lamellate separating from the axis which is 5-angled, seeds pendulous compressed imbricate produced downwards into a wing, albumen sparse fleshy, cotyledons subfoliaceous, radicle short superior exserted. Tall trees, leaves unequally pinnated, leaflets opposite or nearly so, many-paired, unequal sided, panicles terminal, flowers small.

CEDRELA TOONA. (Roxb.) Leaves abruptly pinnate, leaflets from 6 to 12 pair ovato-lanceolate acuminate, 2½ to 5 inches long, 1¼ to 1¾ broad, slightly undulated on the margin, quite entire or slightly and distinctly toothed glabrous, panicles drooping, petals ciliated, staminodes none ; ovary with a very short stalk and 8 ovules in each cell, capsule oblong. *Roxb. Fl. Ind.* i. 635 ;—*WA. Prod.* 124 ;—*Wight Icones t.* 161.

A large tree with an erect trunk and light gray smooth bark, found in almost all the forests of the Madras Presidency, Bombay, Mysore, Bengal and Burmah ; it ascends the mountains to an elevation of about 4000 *feet, confines itself generally to the dry deciduous tracts of forest, but is sometimes met with in sholas. It is the white cedar of Europeans, and is often but erroneously called the Chittagong-wood ; it is known by the name of Toon in Bengal, Suli and Máli in the Salem district, Kal kilingi on the slopes of the Nilgiris, and Sandani Vembu in Tinnevelly. It is often employed as an avenue tree and is much planted for this purpose in some parts of the Salem district. It grows very readily from seed, and the Forest Department have now a considerable plantation of it on the Shevaroys near Salem. The timber is well known, it is of a light rose color, not strong, but light close grained and beautifully veined, easily worked and susceptible of a high polish ; when sawn it emits an agreeable aroma ; a cubic foot unseasoned weighs* 36-40 *lbs. and when seasoned* 31 *lbs., and its specific gravity is* ·496 *; it is much used for furniture and cabinet purposes, and also for building. In Assam admirable boats are made from it. The tree flowers in April and May, its flowers are very fragrant and are used in Mysore for dyeing a red color called Gulinari ; the seeds ripen towards the end of the rains ; the bark is a powerful astringent and is useful in cases of fever, diarrhœa and dysentery, and the natives apply it when powdered externally in the treatment of ulcers. Nees von Esenbeck has published an account of the analysis of the bark, which indicated the existence of a resinous astringent matter, a brown astringent gum, and a gummy brown extractive matter resembling ulmine. The tree is called Thit-ka-do in Birmah ; it is curiously quite absent from Ceylon.*

Analysis.

1. A flower bud, petals imbricate.
2. A full flower, petals erect.
3, 4. Full flowers pressed open to shew the 5 stamens inserted on the summit of the thick disk which is adnate to the base of the ovary.
5. A petal.
6. Anther, front view.
7. Anther, back view, shewing that it is versatile.
8. Ovary cut vertically, ovules eight in 2 rows, style and disk-like stigma.
9. Ovary cut transversely, shewing the 5 cells and double row of ovules.
10. Branch in fruit, the capsules (as in Soymida), the 5 valves bursting from the apex, and leaving the persistent axis to which the dissepiments are attached (*i. e.*, septifragal dehiscence.)
11. A seed.
12. The same cut transversely, shewing the wing. (Drawn from living specimens.)



Cedrela Toona (Roxb.)

CHLOROXYLON SWIETENIA. (Nat. order Meliaceæ.)

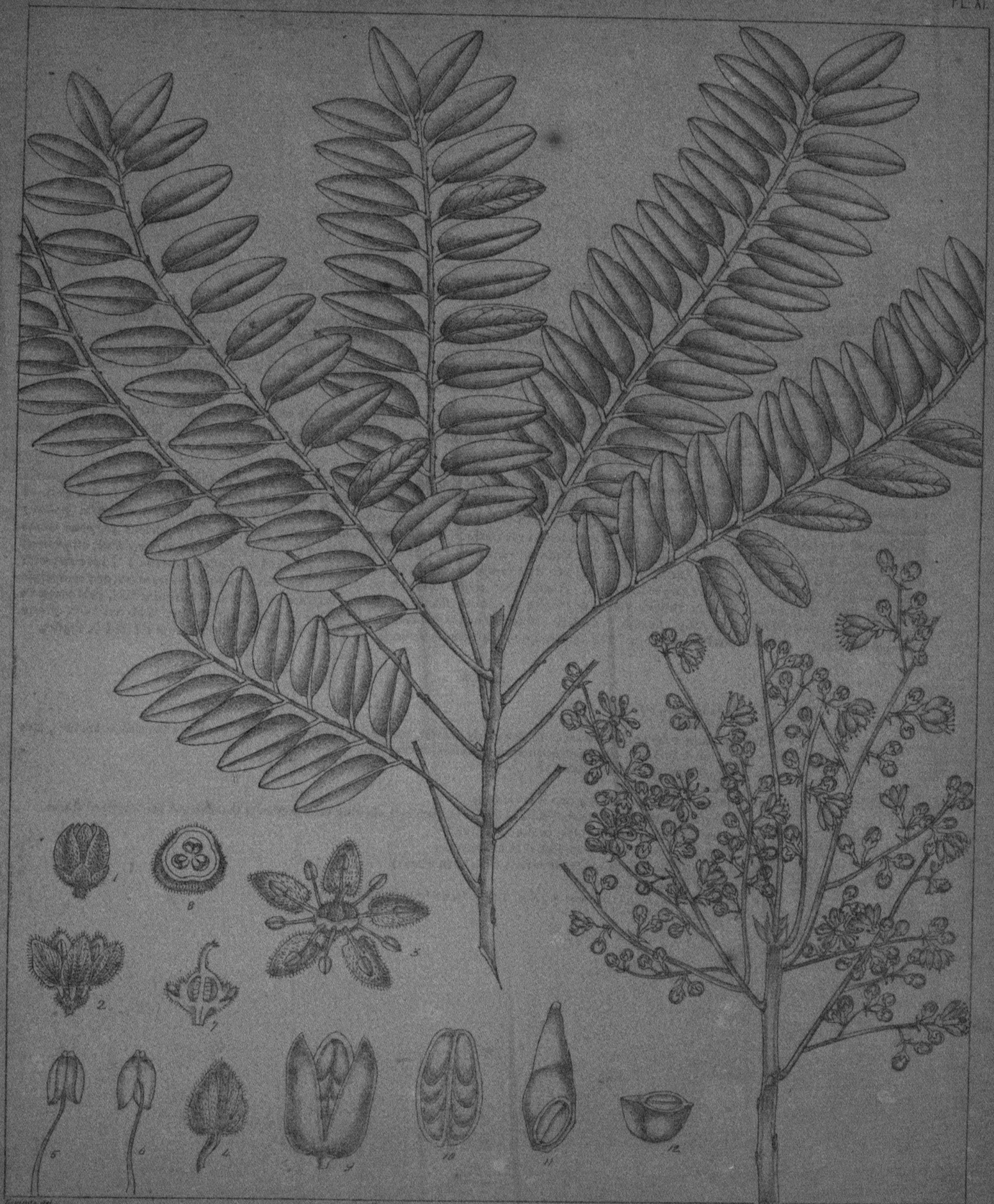
CHLOROXYLON, (*DC*) *Gen. Pl. p.* 340.—GEN. CHAR. Calyx short 5-parted, petals 5 patent unguiculate imbricate, disk thick 10-lobed pubescent, stamens 10 inserted into the sinuses of the disk, filaments subulate alternately longer, anthers cordate apiculate versatile, ovary pubescent half immersed in the disk depressed 3-lobed 3-celled, style short, stigma obscurely 3-lobed, ovules 8 in each cell fixed to the axis ascending, capsule oblong coriaceous 3-celled, 3-valved dehiscing from the apex septifragal, seeds 4 6 in each cell ascending extending upwards (in an opposite direction from the hilum) into a wing, embryo exalbuminous, cotyledons plano-convex, radicle short. A tree with abruptly pinnate leaves.

CHLOROXYLON SWIETENIA. (DC). Leaflets alternate or nearly opposite pale colored small, from 10 to 20 pair, semi-cordate oblong unequal-sided furnished with minute pellucid dots, flowers in terminal or axillary panicles. *WA. Prod. p.* 123. Swietenia chloroxylon, *Roxb. Fl. Ind.* ii. 400 ;—*Wight. Ill.*

This is the well known Satinwood tree. It is common throughout the Madras Presidency, Mysore and in Ceylon, and is sparingly found in Bombay ;—it is generally found about the foot of hills and rarely ascends the slopes above a thousand feet or so. The wood is close grained and yellow, very hard and durable, and excellent for turning, and is much used for furniture and picture frames as it takes a beautiful polish ; it is however very liable to warp and split if not well seasoned in the shade. It stands well under water, and is used for various purposes in the Gun-carriage Manufactory. It is much cut away in the Madras Presidency, as it is highly prised by the natives for ploughs, axle-trees, oil presses, &c., but especially the former, so that fine trees are rarely met with except in out-of-the-way places, (such as the Collegal forests.) I have met with it 8 feet in girth, but it is found much larger in Ceylon. A cubic foot weighs about 56-60 lbs when seasoned and 70-75 unseasoned, and its specific gravity is ·960. It is called Billu in Teligoo, Burus or Purush in Tamil, Bheyroo (Oorsa) in Gumsoor, Dhoura in Hindustani, Vaee-mara in Tinnevely, Billu and Hulda in Bombay, Buruta in Ceylon. It flowers in the hot season and ripens its seeds in the rains. I do not know of any attempts to plant it. The tree yields a wood oil. The natives apply the leaves to wounds. "Flower Satin" is obtained from the root in Ceylon.

Analysis.

1. A flower bud, petals imbricate.
2. A full flower.
3. The same fully opened, stamens 10 alternately shorter, the filaments inserted into the sinuses of the disk at the base, disk thick 10-lobed, ovary pubescent semi-immersed on the disk.
4. A petal shewing its unguiculate base.
5. Anther, front view.
6. Anther, back view, shewing that it is versatile.
7. Ovary cut vertically, 4 collateral pairs of ovules in each cell, shewing cross section of the disk and the 3-toothed stigma.
8. Ovary cut transversely 3 celled, ovules in 2 rows.
9. The 3-celled 3-valved capsule just as it has burst.
10. A valve of the capsule and the imbricate seeds (8 in 2 rows).
11. A seed, the base cut through.
12. A seed cut through transversely. (Nos. 1 to 9 drawn from living specimens)



Ceratoxylon Novæ Zeelandiæ (Pl. 8)

MELIA COMPOSITA. (Nat. order Meliaceæ.)

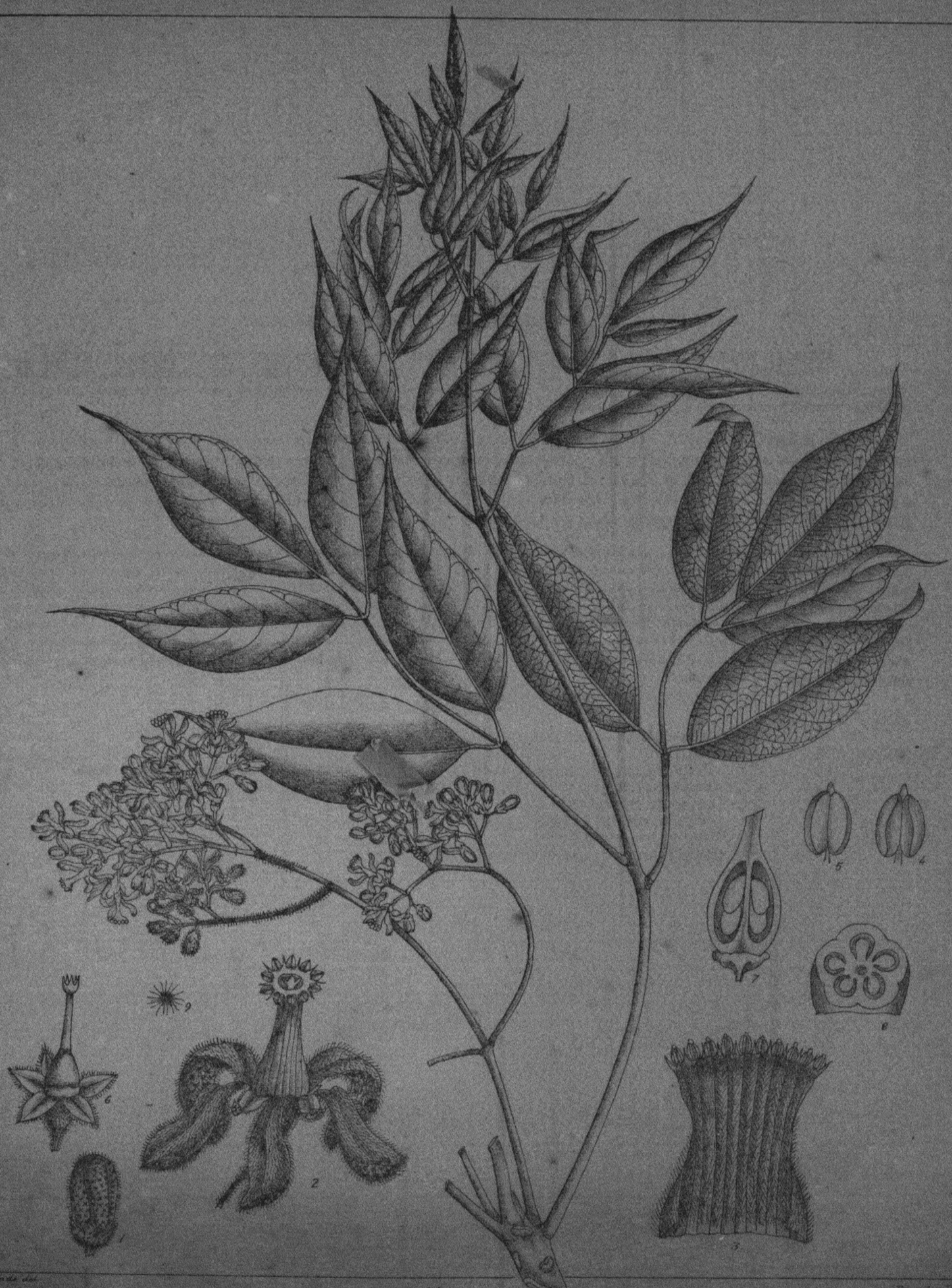
MELIA, (*Linn.*) *Gen. Pl. p.* 332.—GEN. CHAR. Calyx 5-6-partite, lobes imbricate, petals as many as calyx lobes, spreading cont. æstivation. Stamens 10-12 monadelphous, anthers included within the slightly dilated 10-12-cleft mouth of the cylindrical tube, ovary 3-6-celled, slender, stigma capitate, ovules 2 in each cell superposed, or collateral, fruit drupaceous with a 1-5-celled bony putamen. Trees, leaves alternate 2 3-pinnate (or simply pinnate), panicles ample axillary usually collected towards the end of the branches.

MELIA COMPOSITA. (Willd.) Young shoots petioles and panicles very mealy, leaves bi-tripinnate alternate 12 to 18 inches long, pinnæ about 3 pair, leaflets 3-7 pair to each pinna, ovate acuminate crenulated glabrous 2 to 3 inches long, panicles axillary scarcely half the length of the leaves, flowers numerous small whitish inodorus, calyx and petals mealy, stigma large with a 5 pointed apex, drupe ovate the size of a large olive, smooth and yellowish green when ripe. *WA. Prod. p.* 117. Melia robusta, *Roxb. Fl. Ind.* ii. *p.* 397. M. superba, *Roxb. l. c. p.* 396.

A very large and most handsome tree with a smooth dark brown bark, common in Malabar, Wynaad, Coorg, Mysore, and South Canara, and other parts of our Presidency. It is known to natives by the name of Mallay Vemboo, which is applied also to Melia Azadarach, and its timber is often used by planters for building purposes ; it may however be said to be scarcely known in our Presidency, and as a quick growing tree of great ornament it is very desirable that it should be introduced to Madras and elsewhere, for avenue and ornamental planting; it seeds well and grows readily from seeds. Seeds sent by Dr. Berry many years ago from Malabar to the Calcutta Botanical Gardens, produced in 7 years trees of a height of 46 feet and a circumference of 44 inches 4 feet from the ground. It is common in Ceylon, and is known by the native name of Lunu Midella, and Mr. W. Ferguson of that island says the timber is very light and cedar-like, and in use for out-riggers of boats and for ceilings, and that it is said white-ants will not attack it.

Analysis.

1. A flower bud, petals contorted.
2. A full flower.
3. Calyx tube gibbous at the base, 10-toothed at the apex, anthers subsessile, one between each of the teeth.
4, 5. Anthers front and back view, shewing that they have very short filaments.
6. Disk, ovary, style and stigma.
7. Ovary cut vertically, 2 pendulous superposed ovules.
8. Ovary cut transversely 5 cells.
9. Stellate pubescence. (All drawn from dried specimens.)



Melia composita Willd.